A BEARING APPARATUS FOR A WHEEL OF VEHICLE

BACKGROUND OF THE INVENTION

【0001】

Field of the Invention

The present invention relates to a bearing apparatus for a wheel of vehicle for rotatably supporting the wheel relative to a suspension apparatus of vehicle, and more particularly to a bearing apparatus for a wheel of vehicle of semi-floating type in which a driving wheel is supported by a double row rolling bearing.

【0002】

Description of Background Art

In a vehicle such as a truck having a body of frame structure, an axle structure of driving wheel of full-floating type has been widely adopted. In a recent driving wheel supporting structure, there has been widely adopted a unit structure of a double row rolling bearing so as to improve the readiness of assembly, reduction of weight and size. One example of such a bearing apparatus for a wheel of vehicle of the prior art is shown in Fig. 9.

【0003】

In this bearing apparatus for a wheel of vehicle, a driving shaft 52 connected to a differential apparatus (not shown) is inserted into an axle housing 51 and a double row conical roller bearing 53 is mounted on the axle housing 51. A hub wheel 54 rotatably supported by the double row conical roller bearing 53 is connected to a flange 56 via hub bolts 55. A pair of inner ring 57 are connected each other by a connecting ring 58 and fitted onto the end of the axle housing 51 and then securely fastened by a fastening nut 59. On the other hand an outer ring 60 of the double row conical roller bearing is

fitted into the hub wheel 54 and axially secured with its both ends being sandwiched by the flange 56 of the driving shaft 52 and a brake rotor 61. A double row conical rollers 62 are rollably contained by cages 63 between the annular space between the inner and outer rings 57 and 60 and seals 64 are arranged at both ends of the annular space to seal the inside of the wheel bearing off from the outside.

【0004】

The inboard side end of the inner ring 57 is formed with an annular stepped portion 65 on which a seal ring 66 is mounted. An annular recess 67 is formed on the outer circumferential surfaces at mutually abutted portions of the pair of inner rings 57 and a seal ring 68 of elastic member is fitted therein. These seal rings 66 and 68 prevent penetration or ingress of rain water or dusts into the axle housing 51, leakage of differential gear oil to outside and ingress of the differential gear oil into the inside of the bearing (see Japanese Laid-open Patent publication No. 99172/2001).

Disclosure of the Invention

Problems to be solved by the Invention

【0005】

However since the bearing apparatus for a wheel of vehicle of the prior art has a structure such that the double row of conical roller bearing 53 is arranged between the hub wheel 54 and the axle housing 51 and that the driving shaft 52 is inserted into the axle housing 51 and then the flange 56 of this driving shaft 52 is connected to the hub wheel 54 by the hub bolts 55, reduction of the weight and size of the bearing apparatus is limited as well as assembly of the bearing apparatus is complicated by requirement of a large number of structural parts.

SUMMARY OF THE INVENTION

【0006】

It is therefore an object of the present invention to provide a bearing apparatus for a wheel of vehicle which can reduce the weight, size and a number of parts and also can prevent ingress of rain water or dusts and leakage of differential gear oil.

【0007】

For achieving the object, there is provided, according to the present invention of claim 1, a bearing apparatus for a wheel of vehicle comprising: an axle housing supported under a body of vehicle; a hollow driving shaft inserted into the axle housing; and a wheel bearing arranged between the driving shaft and an opening of the axle housing and structured as a unit of a hub wheel and a double row rolling bearing; the wheel bearing comprising: an inner member including a hub wheel integrally formed on one end thereof with a wheel mounting flange and having an axially extending cylindrical portion; and inner rings press-fitted onto the cylindrical portion of the hub wheel and formed on which outer circumferential surface with at least one of inner raceway surfaces; an outer member arranged around the inner member and formed with double row outer raceway surfaces on its inner circumferential surface oppositely to the inner raceway surfaces; double row rolling elements arranged between the inner and outer raceway surfaces of the inner member and the outer member; a cage for freely rollably holding the rolling elements; and seals for sealing an annular space between the inner member and the outer member; characterized in that a cap having metal core of steel is press-fitted into an end of central bore of the hub wheel.

【0008】

According to the present invention of claim 1, since a cap having metal core of steel is press-fitted into an end of central bore of the hub wheel forming the wheel bearing apparatus, it is possible to provide a bearing apparatus for a wheel of vehicle of a semi-floating type which can reduce the

weight and size and also can prevent the leakage of differential gear oil to the outside as well as the ingress of rain water or dusts from the outside into the differential gear oil through the driving shaft.

【0009】

According to the present invention of claim 2, since said at least one of inner raceway surfaces is formed directly on the outer circumferential surface of the hub wheel, it is possible to further reduce the weight and size and increase the rigidity of the bearing.

【0010】

According to the present invention of claim 3, since the end of said cylindrical portion is plastically deformed radially outward to form a caulked portion for preventing the inner ring from being slipped off from the cylindrical portion of the hub wheel, it is unnecessary to control the amount of preload of the bearing as in the prior art by tightly fastening the inner ring using a nut. Thus easiness of assembly of the bearing apparatus to a vehicle can be improved and the predetermined amount of preload can be kept for a long term. In addition it is possible to substantially reduce the number of parts and to reduce the manufacturing cost and the weight and size of the bearing due to the improvement of the easiness of assemble.

【0011】

Preferably according to the present invention of claim 4, since the outer circumferential region of the wheel mounting flange from its base of inboard side to the cylindrical portion is hardened by high frequency induction hardening as having the surface hardness 54～64 HRC, and the caulked portion is remained unhardened as having the surface hardness of 25 HRC or less after forging, it is possible to improve the durability of the hub wheel and workability of the caulked portion during its plastic deformation and thus the reliability of quality of the bearing.

【0012】

According to the present invention of claim 5, since said cap is press-fitted into the central bore of the wheel mounting flange of hub wheel, the cap can be positioned at a region having high rigidity of the hub wheel. Accordingly, the cap is scarcely influenced by elastic deformation of the hub wheel and thus it is possible to prevent generation of a radial gap between the cap and the hub wheel.

[0013]

According to the present invention of claim 6, since said cap comprises a metal core of steel having a cross-section of substantially "C" configuration and an elastic member attached to at least part of its fitting portion, the elastic member can intimately contact the fitting surface and thus can securely seal the inside of the hub wheel.

[0014]

According to the present invention of claim 7, since said cap is press-fitted so that the circumferential edge of its fitting portion is oriented toward the outboard side, the press-fitting operation can be easily carried out. In addition since the edge side of low rigidity is positioned at the outboard side, the cap does not move toward the outboard side and thus slipping off of the cap from the hub wheel can be prevented although the metal core is moved axially due to its deformation caused by elastic deformation of the hub wheel.

[0015]

According to the present invention of claim 8, since said circumferential edge of the fitting portion of the metal core is formed with a bead extending radially outward, and an annular groove with which the bead engages is formed on the central bore of the hub wheel, it is possible to securely prevent the axial movement of the cap and thus to further improve the reliability of the cap.

[0016]

According to the present invention of claim 9, since said cap is limited against an axial movement by steps provided at either sides of the cap, it is possible to securely prevent the cap being slipped off from the hub wheel although the hub wheel is elastically deformed by repeating load applied thereto during running of a vehicle.

【0017】

According to the present invention of claim 10, since said cap comprises a metal core of steel having a cross-section of substantially "C" configuration, an annular recess is formed on the inner circumferential surface of the hub wheel, and the fitting portion of the cap is formed with a projection adapted to be engaged with the annular recess, it is possible to easily mount the cap on the hub wheel and to prevent the axial movement of the cap with a simple structure.

【0018】

Preferably according to the present invention of claim 11, since said projection is formed by plastic deformation after the cap has been press-fitted into the bore of the hub wheel, the cap can be further intimately fitted in the annular groove of the hub wheel without any rattle and thus the axial movement of the cap and therefore the leakage of differential gear oil can be further prevented by the mating of the projection and bore.

【0019】

Preferably according to the present invention of claim 12, since said cap is press-fitted with a interference of 0.05～0.3 mm, it is possible to prevent generation of the radial gap between the cap and the hub wheel due to errors in configuration of the cap and thus to prevent the leakage of differential gear oil therethrough. In addition the cap can be easily press-fitted into the hub wheel and the buckling of the cap which would be caused by large interference can be also prevented.

Effect of the Invention

【0020】

According to the bearing apparatus for a wheel of vehicle of the present invention, since it comprises an axle housing supported under a body of vehicle; a hollow driving shaft inserted into the axle housing; and a wheel bearing arranged between the driving shaft and an opening of the axle housing and structured as a unit of a hub wheel and a double row rolling bearing; the wheel bearing comprising: an inner member including a hub wheel integrally formed on one end thereof with a wheel mounting flange and having an axially extending cylindrical portion; and inner rings press-fitted onto the cylindrical portion of the hub wheel and formed on which outer circumferential surface with at least one of inner raceway surfaces; an outer member arranged around the inner member and formed with double row outer raceway surfaces on its inner circumferential surface oppositely to the inner raceway surfaces; double row rolling elements arranged between the inner and outer raceway surfaces of the inner member and the outer member; a cage for freely rollably holding the rolling elements; and seals for sealing an annular space between the inner member and the outer member; and it is characterized in that a cap having metal core of steel is press-fitted into an end of central bore of the hub wheel, it is possible to provide a bearing apparatus for a wheel of vehicle of a semi-floating type which can reduce the weight and size and also can prevent the leakage of differential gear oil to the outside as well as the ingress of rain water or dusts from the outside into the differential gear oil through the driving shaft.

Best mode for carrying out the Invention

【0021】

According to the present invention, there is provided a bearing apparatus for a wheel of vehicle comprising: an axle housing supported under a body of vehicle; a hollow driving shaft inserted into the axle housing; and a

wheel bearing arranged between the driving shaft and an opening of the axle housing and structured as a unit of a hub wheel and a double row rolling bearing; the wheel bearing comprising: an inner member including a hub wheel integrally formed on one end thereof with a wheel mounting flange and having an axially extending cylindrical portion; and inner rings press-fitted onto the cylindrical portion of the hub wheel and formed on which outer circumferential surface with at least one of inner raceway surfaces; an outer member arranged around the inner member and formed with double row outer raceway surfaces on its inner circumferential surface oppositely to the inner raceway surfaces; double row rolling elements arranged between the inner and outer raceway surfaces of the inner member and the outer member; a cage for freely rollably holding the rolling elements; and seals for sealing an annular space between the inner member and the outer member; characterized in that a cap having metal core of steel is press-fitted into an end of central bore of the hub wheel.

BRIEF DESCRIPTION OF THE DRAWINGS

Additional advantages and features of the present invention will become apparent from the subsequent description and the appended claims, taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is a longitudinal-section view of a first embodiment of a bearing apparatus for a wheel of vehicle of the present invention;

Fig. 2 is a partially enlarged longitudinal-section view of Fig. 1 showing a wheel bearing;

Fig. 3 is a longitudinal-section view of a second embodiment of a bearing apparatus for a wheel of vehicle of the present invention;

Fig. 4 is a partially enlarged longitudinal-section view of Fig. 3;

Fig. 5 is a longitudinal-section view of a third embodiment of a bearing apparatus for a wheel of vehicle of the present invention;

Fig. 6 is a longitudinal-section view of a fourth embodiment of a bearing apparatus for a wheel of vehicle of the present invention;

Fig. 7(a) and 7(b) are a partially enlarged longitudinal-section view of a modification of the fourth embodiment showing respectively a condition of a cap before and after caulking thereof;

Fig. 8 is a longitudinal-section view of a fifth embodiment of a bearing apparatus for a wheel of vehicle of the present invention; and

Fig. 9 is a longitudinal-section view of a bearing apparatus for a wheel of vehicle of the prior art.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Preferred embodiments of the present invention will be described with reference to accompanied drawings.

First embodiment

【0022】

Fig. 1 is a longitudinal-section view of a first embodiment of a bearing apparatus for a wheel of the present invention, and Fig. 2 is a partially enlarged longitudinal-section view of Fig. 1. In the description of the present invention, a side of a bearing positioned outward a vehicle when it is mounted on a vehicle is referred to as "outboard" side (the left side in a drawing), and a side inward a vehicle is referred to as "inboard" side (the right side in a drawing).

【0023】

In a bearing apparatus for a wheel of vehicle of the present invention, a hub wheel 1 and a double row rolling bearing 2 are formed as a unit and connected to a driving shaft "D/S". The double row rolling bearing 2 comprises an inner member 3, an outer member 4, and a double row rolling elements (tapered rollers) 5 freely rollably contained between the inner and outer members 3 and 4. The inner member 3 includes the hub wheel 1 and a pair of

inner rings 10 press-fitted onto the hub wheel 1. The hub wheel 1 is integrally formed, at its outboard side, with a wheel mounting flange 6 on which, a wheel "W" and a brake rotor "B" are mounted and from which an axially extending cylindrical portion 7 extends. An inner circumferential surface (bore) of the hub wheel 1 is formed with a serration (or spline) 8 into which a serrated portion of the driving shaft "D/S" is inserted so that a torque can be transmitted therebetween.

[0024]

As shown in Fig. 2, the double row rolling bearing 2 comprises an outer member 4 formed with double row outer raceway surfaces 4a on its inner circumferential surface and with a body mounting flange 4b to be secured on an axle housing "H" on its outer circumferential surface, a pair of inner rings 10 inserted in the outer member 4 and formed with double row tapered inner raceway surfaces 10a, 10a on its outer circumferential surface oppositely to the outer raceway surfaces 4a, double row rolling elements 5 arranged between the inner and outer raceway surfaces 10a, 4a, and a cage 11 for freely rollably holding the rolling elements 5. Each of the inner rings 10 is formed with, at its larger diameter end, a large flange 10b for guiding the rolling elements 5. The pair of inner rings 10 are arranged so that their inner ends are abutted each other and thus form so-called a back-abutted type double row tapered roller bearing. Seals 12are arranged at either ends of the outer member 4 seal an annular space between the outer member 4 and the inner rings 10. These seals 12 prevent both penetration of rain water or dusts from the external circumstances and leakage of lubricating grease sealed within the bearing. The inboard side seal 12 further prevents penetration or ingress of differential gear oil into the inside of the bearing.

[0025]

The pair of inner rings 10 are press-fitted onto the cylindrical portion 7 of the hub wheel 1 and are prevented from being axially slipped off from the

cylindrical portion 7 by a caulked portion 13 formed by plastically deforming the end of the cylindrical portion 7 radially outward. Since this embodiment adopts the self-retaining structure of the second generation, it is not required to control an amount of preload as a conventional manner by tightly fastening a nut against the inner ring. Accordingly, it is possible to substantially reduce the number of parts and thus to improve the readiness of assembly as well as to reduce its manufacturing cost, weight and size.

【0026】

The hub wheel 1 is made of medium carbon steel such as S53C including carbon of 0.40～0.80%by weight and hardened by high frequency induction quenching so that the base of the wheel mounting flange 6 at its inboard side and the cylindrical portion 7 of the hub wheel 1 have the surface hardness of 54～64 HRC (the hardened portion is shown in drawings by cross-hatched lines). The caulked portion 13 is remained as a unhardened portion having its surface hardness of 25 HRC or less. This improves the durability and workability of the caulked portion 13 and also prevents generation of cracks therein.

【0027】

The outer member 4 is also made of medium carbon steel such as S53C including carbon of 0.40～0.80%by weight and the double row outer raceway surfaces 4a and inner circumferential surface of the outer member 4 on which the seal 12is mounted are hardened by high frequency induction quenching so that their surface hardness is within 54～64 HRC. On the other hand, the inner rings 10 is made of high carbon chrome bearing steel such as SUJ2 and hardened to its core by dipping quenching to have the surface hardness of HRC 54～64. Although it is herein illustrated a double row tapered roller bearing using tapered roller as rolling elements 5, the double row angular ball bearing using balls may be also used.

【0028】

In this embodiment, a cap 9 is press-fitted into an opening of the hub wheel 1 at its outboard side. This cap 9 is made of austenitic-stainless steel sheet (JIS SUS 304 etc.) or preserved cold rolled steel sheet (JIS SPCC etc.) and formed as an annular shape by press working. The cap 9 comprises a metal core 9a of steel formed as having a substantially "C"-shaped cross-section, and an elastic member 9b of rubber bonded via vulcanization to at least the fitting portion of the metal core 9a. The elastic member 9b is elastically deformed during the cap 9 is press-fitted into the opening of the hub wheel 1 to seal the opening for surely preventing ingress of rain water or dusts from the ambient circumstances into the driving shaft "D/S" and thus into the differential gear oil.

【0029】

It is preferable that the cap 9 is press-fitted into the hub wheel 1 with a interference of 0.05～0.3 mm. This is because that differential gear oil could leak through small radial gap which would be caused in the fitting portion between the hub wheel 1 and the cap 9 due to dimensional error of cap itself when the interference less than 0.05 mm, on the other hand, the press-fitting operation of the cap 9 would become difficult and buckling of the metal core itself would be caused when the interference is larger than 0.3 mm. In addition it is preferable that the cap 9 is press-fitted into the hub wheel 1 at a high rigid bore portion thereof, that is a bore portion of the hub wheel 1 at or near the wheel mounting flange 6. Accordingly, the cap 9 is scarcely influenced by elastic deformation of the hub wheel 1 although the hub wheel 1 would be deformed by repeating moment load applied thereto.

Second embodiment

【0030】

Fig. 3 is a longitudinal-section view of a second embodiment of a bearing apparatus for a wheel of vehicle of the present invention. Since difference of this embodiment from the first embodiment only resides in the

structure of the hub wheel, same numerals are used as those used in the first embodiment for designating the same structural elements.

【0031】

This bearing apparatus for a wheel of vehicle is structured as a unit of the hub wheel 14 and a double row rolling bearing 15. The double row rolling bearing 15 comprises an inner member 16, an outer member 4, and a double row rolling elements 5 and 5 freely rollably contained between the inner and outer members 16 and 4. The inner member 16 includes the hub wheel 14 and the 10 press-fitted onto the hub wheel 14. The hub wheel 1 is integrally formed, at its outboard side, with a wheel mounting flange 6 on which, a wheel (not shown in Fig. 3) is mounted and with an inner raceway surface 14a of the outboard side of the bearing 15and has the cylindrical portion 7 axially extending from the inner raceway surface 14a. The hub wheel 14 is formed on its inner circumferential surface (bore) with a serration (or spline) 8 into which a serrated portion of the driving shaft (not shown in Fig. 3) is inserted so that a torque can be transmitted therebetween.

【0032】

The outer circumferential surface of the hub wheel 14 is formed with a flange portion 14b corresponding to the large flange 10b of the inner ring 10, and a stepped portion 14c to which an inner end face (smaller end face) abuts. Thus the so-called back-abutted type double row tapered roller bearing is structured. In addition The inner ring 10 is press-fitted onto the cylindrical portion 7 of the hub wheel 14 and is prevented from being axially slipped off from the cylindrical portion 7 by a caulked portion 13 formed by plastically deforming the end of the cylindrical portion 7 radially outward. Since this embodiment adopts the self-retaining structure of such a third generation, it is not required to control an amount of preload as a manner similar to the first embodiment by tightly fastening a nut against the inner ring. Accordingly, it is possible to improve the readiness of assembly as well as to

maintain the amount of preload for a long term.

[0033]

Since the inner raceway surface 14a is directly formed on the outer circumferential surface of the hub wheel 14, the rigidity of the hub wheel 14 is increased. Accordingly, it is possible to reduce the weight and size of the bearing apparatus and to improve its although the hub wheel 14 would be deformed by a moment load applied thereto during running of vehicle.

[0034]

In this embodiment a cap 17 is press-fitted into an opening of the hub wheel 14 at its outboard side. This cap 17 is made of austenitic-stainless steel sheet (JIS SUS 304 etc.) or preserved cold rolled steel sheet (JIS SPCC etc.) and comprises a metal core18 formed as having a substantially "C"-shaped cross-section, and an elastic member 19 of rubber bonded via vulcanization to the outer surface of the metal core 18. The metal core 18 is press-fitted into the hub wheel 14 so that the circumferential edge of the cylindrical fitting portion 18a is oriented toward the outboard side. This makes the press-fitting operation of the cap 17 easy. In addition since the edge portion of the cap 17 having low rigidity is positioned at the outboard side, the cap 17 does not move toward the outboard side and thus it is possible to prevent the cap 17 being slipped off from the hub wheel 14 although the metal core 18 is deformed due to the elastic deformation of the hub wheel 14.

[0035]

As clearly shown in Fig. 4, there is formed at the circumferential edge a bead 18b extending radially outward. It is possible to securely prevent axial movement of the cap 17 by engaging the bead 18b with an annular groove 20 formed on the inner circumferential surface (bore) of the hub wheel 14.

Third embodiment

[0036]

Fig. 5 is an enlarged partial view of a third embodiment of a bearing

apparatus for a wheel of vehicle of the present invention. Same numerals are used herein as those used in the previous embodiments for designating the same structural elements.

【0037】

In this embodiment a cap 21 is press-fitted into an opening of the hub wheel 1 at its outboard side. This cap 21 is made of austenitic-stainless steel sheet (JIS SUS 304 etc.) or preserved cold rolled steel sheet (JIS SPCC etc.) and comprises a metal core 21a of steel formed as having a substantially "C"-shaped cross-section, and an elastic member 21b extended from the inner circumferential surface to the cylindrical fitting portion of the metal core 21b. The elastic member 21b comprises a material such as rubber bonded via vulcanization to the surface of the metal core 21a and has functions of preventing generation of rust on the metal core 21a and sealing the inside of the hub wheel 1 from the outside with intimate contact of the elastic member 21b to the inner circumferential surface (bore) of the hub wheel 1. Accordingly it is possible to prevent ingress of rain water or dusts from the ambient circumstances into the driving shaft and thus into the differential gear oil and leakage of the differential gear oil to the outside.

【0038】

The axial movement of the cap 21 is limited by a stop ring 22 secured on the inner circumferential surface of the hub wheel 1 and a stepped portion 23. Thus it is possible to prevent the cap 21 being slipped off from the hub wheel 1 although the hub wheel 1 is deformed by the repeating moment load applied thereto during running of vehicle. Projections 24 co-axially formed on the metal core 21a increase the rigidity of the metal core 21a and improve the buckling resistance.

Fourth embodiment

【0039】

Fig. 6 is an enlarged partial view of a fourth embodiment of a bearing

apparatus for a wheel of vehicle of the present invention. Same numerals are used herein as those used in the previous embodiments for designating the same structural elements.

【0040】

In this embodiment an annular recess 25 having a circular arc cross section is formed on the inner circumferential surface (bore) of the hub wheel 1 and a cap 26 formed with a projection 26a having a cross section corresponding to the annular recess 25 is snapped therein. This makes the mounting of the cap 26 easy and enables to prevent the axial movement of the cap 26 with a simple structure. In this case, it is unnecessary to form the projection 26a on whole circumference of the cap 26 and three or more projections will sufficiently perform this function.

【0041】

Fig. 7 is a partially enlarged longitudinal-section view of a modification of the fourth embodiment. Same numerals are used herein as those used in the previous embodiment (Fig. 6) for designating the same structural elements.

A cap 27' has a cross section of substantially "C" configuration and is press-fitted into the inner circumferential surface (bore) of the hub wheel 1 with a predetermined interference. Then the cap 27' is plastically deformed by a rolling tool and fitted into the annular recess 25. The projection 26a thus formed can further intimately contact the annular recess 25 of the hub wheel 1 without rattle. Accordingly it is possible to further effectively prevent the axial movement of the cap 27' and to securely prevent the leakage of the differential gear oil by this projection 26a in cooperation with the fitting portion 26b.

Fifth embodiment

【0042】

Fig. 6 is an enlarged partial view of a fifth embodiment of a bearing

apparatus for a wheel of vehicle of the present invention. Same numerals are used herein as those used in the previous embodiments for designating the same structural elements.

【0043】

In this embodiment, a cap 29 is press-fitted into the hub wheel 1 over a region of the inner circumferential surface (bore) from its opened end at the outboard side to a pilot portion 28. The cap 29 is made of austenitic-stainless steel sheet (JIS SUS 304 etc.) or preserved cold rolled steel sheet (JIS SPCC etc.) and comprises a metal core 29a press-formed as having a substantially "hat"-shaped cross-section, and an elastic member 29b of rubber bonded via vulcanization over a region from the outer circumferential surface of the metal core 29a to the fitting portion and the outboard side end of the hub wheel 1.

【0044】

The elastic member 29b comprises rubber etc. being bonded to the metal core 29a via e.g. vulcanization and can perfectly prevent the leakage of differential gear oil and ingress of rain water or dusts into the differential gear oil through the driving shaft. In addition since the cap 29 closes whole the opened portion of the hub wheel 1and is press-fitted into the portion of the hub wheel 1 which is less deformed although the repeating moment load is applied to the hub wheel 1, it is possible to further prevent the elastic deformation of the cap 29 and its slip off from the hub wheel 1.

Applicability in industry

【0045】

The bearing apparatus for a wheel of vehicle of the present invention can be applied to a bearing apparatus for a wheel of vehicle of driving wheel side of the semi-floating type in which a wheel bearing is arranged in opened portions between a driving shaft and a axle housing.

【0046】

The present invention has been described with reference to the preferred embodiment. Obviously, modifications and alternations will occur to those of ordinary skill in the art upon reading and understanding the preceding detailed description. It is intended that the present invention be construed as including all such alternations and modifications insofar as they come within the scope of the appended claims or the equivalents thereof.